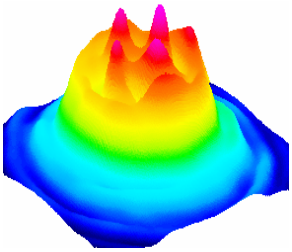
gentec-eo

Advancing the Technology of Laser Analysis

Laser Beam Profilers

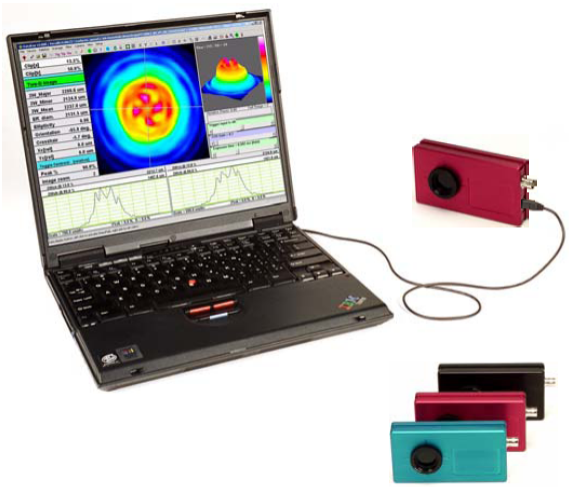
WinCamD™-UCM 2/3" CMOS
WinCamD™-UHR High Resolution – 5.2 µm
WinCamD™-UHS High Speed – 140 Hz/25 kHz



Compact, Portable, Port-Powered, USB 2.0 Beam Profiling

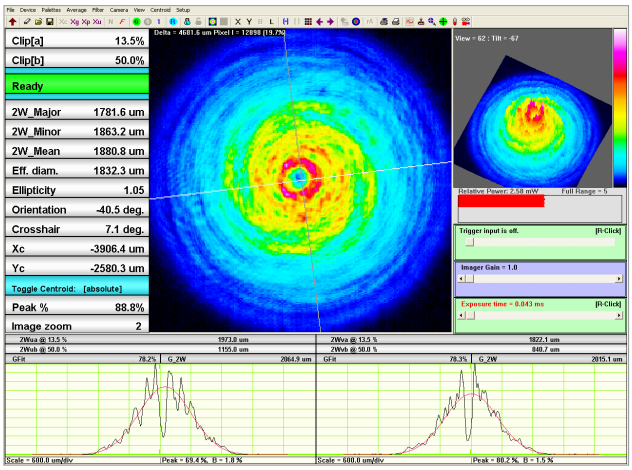
Features

- ◊ USB 2.0 port-powered; flexible 3 m cable; no external power supply required.
- ◊ 1.12" thin to fit tight beam trains [including filter]
- ◊ Digital CMOS cameras with on-chip 10-bit ADC
- ◊ 4 MB image buffer & on-board microprocessor
- ◊ Window-free sensors standard for no fringing
- ◊ 25,000:1 electronic auto-shutter, 40 µs - 1000 s
- ◊ Pulsed laser auto-trigger and synchronization
- ◊ Parallel capture on multiple cameras
- ◊ Field-replaceable CMOS sensors

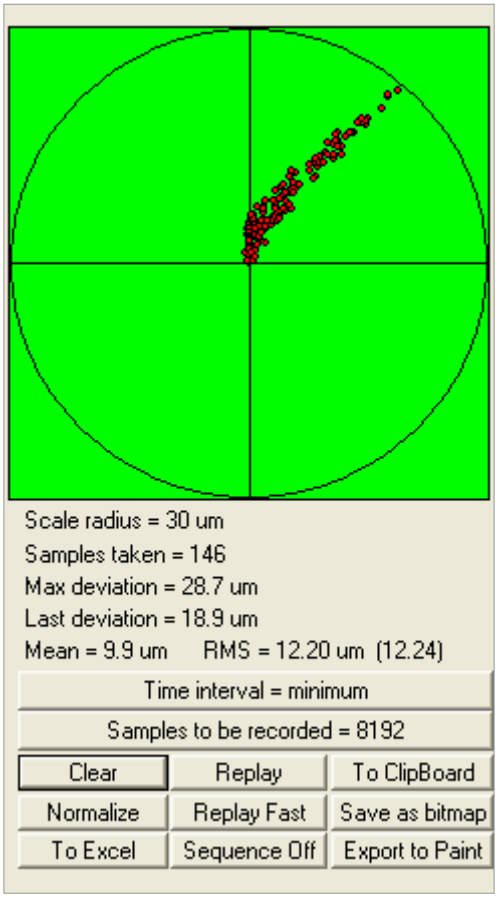


Applications

- ◊ CW & Pulsed laser profiling
- ◊ Field servicing of lasers and laser-based systems
- ◊ Optical assembly & instrument alignment
- ◊ Beam wander & logging
- ◊ M-Squared Measurements … new capability!

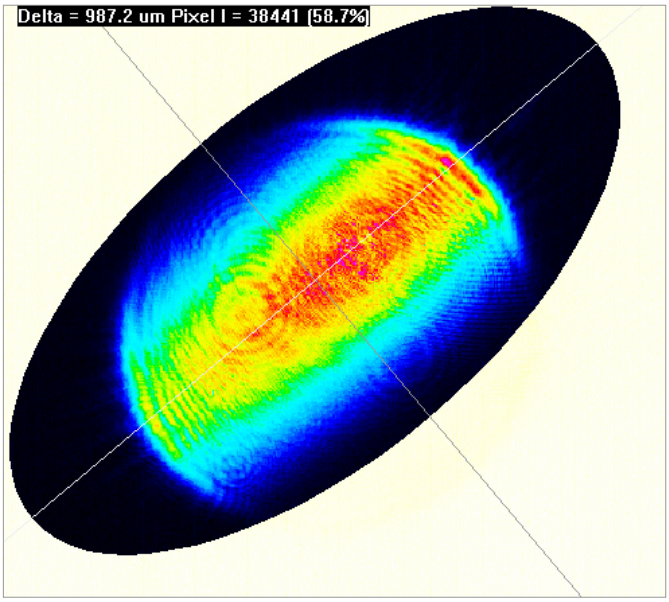


Powerful Beam Analysis Software

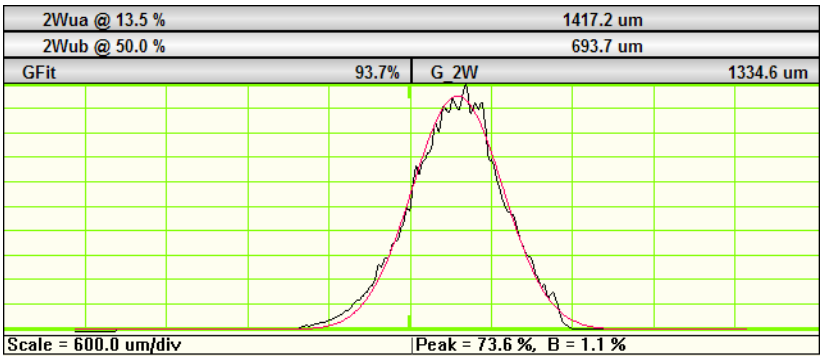


Beam Wander on a drifting Laser
Up to 8192 samples at a User Set interval.
Mean, RMS and Max. deviation.
Replay Fast or Slow.
Export to Excel, Paint, Bitmap or Clipboard.

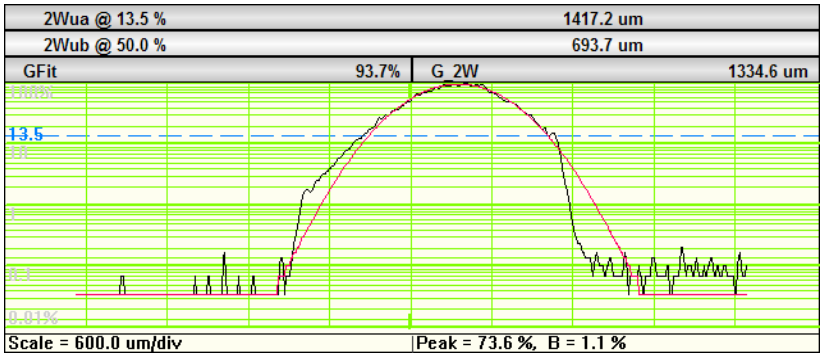
Auto-Inclusion Region on an Elliptical Beam
Automatically isolates the appropriate analysis region.
With user overrides.



Standard Linear Profile
with Gaussian Fit.



Logarithmic Profile
The same profile with Averaging & Log 40 dB display reveals structure in the wings of the beam at levels below 1%.



Gentec-EO Innovation - The company that brought you the first Windows-based CCD beam profiler, the first thin camera for confined spaces, the first software slider exposure and electronic auto-shutter, the first standard window-free CCD for no fringing, the first auto-orientation on the beam ellipse and the first USB 2.0 beam profiling camera … has done it again.

Compact WinCamD-Uxx cameras - small enough to fit in your shirt pocket - join existing Gentec-EO CCD and CMOS cameras to offer either the High Speed capability required to capture single pulses to 25 kHz or High Resolution with a small pixel size of 5.2 µm square.

Features:

- ◊ Digital serial link for EMI immunity
- ◊ XY profiles and centroids
- ◊ Linear and logarithmic displays
- ◊ Gaussian and Top Hat least squares fits
- ◊ Ellipse Angle, Major, Minor, Mean Diameters
- ◊ Background capture and subtraction
- ◊ Image & Intensity Zoom
- ◊ Linear and area filters
- ◊ Image Averaging, 1 to continuous

WinCamD-Uxx CMOS Sensor Specifications:

	-UCM 2/3" CMOS	-UHR High Resolution	-UHS High Speed
Pixel Count & H x V:	1.3 MPixel, 1260 x 1024	1.3 MPixel, 1280 x 1024	355 kPixel, 656 x 496
Sensor image area:	8.6 x 6.9 mm	6.6 x 5.3 mm	6.5 x 4.9 µm
Pixel dimension:	6.7 x 6.7 µm	5.2 x 5.2 µm	9.9 x 9.9 µm
Min. beam (10 pixels):	~70 µm	~50 µm	~100 µm
Shutter type:	Synchronous	Rolling	Synchronous
Max. full frame rate:	~20 Hz	30 Hz	~140 Hz*
Max. 'every pulse' PRR:	~20 Hz	30 Hz	~140 Hz*
Single pulse capture PRR:	~300 Hz	30 Hz	~25 kHz
Signal to RMS Noise:	500:1	1,000:1	800:1
TaperCamD pixel size:	11 x 11 µm	12 x 12 µm	23 x 23 µm
TaperCamD20-15 pixel size:	16 x 16 µm	17 x 17 µm	31 x 31 µm

*Higher for smaller capture blocks. PC speed dependant.
Max capture rate for -UHS ~1.5 kHz Hz at 32 line image

Common WinCamD-Uxx Series Specifications: [Specifications are subject to change without notice]

Wavelength Range	355 to 1150 nm standard 260 to 380 nm UV Options for X-Ray, UV, 1310 nm & 1480 to 1680 nm
High dynamic range	25,000:1 (44 dB) continuously variable auto electronic shutter, <40 µs to 1.0 s. Additional 10,000:1 ND filter + 5:1 electronic control to give >$1.25x10^9$:1.
Pulsed lasers	Auto-trigger sync, TTL input trigger, TTL output trigger.
Compact	115 x 61 x 22 mm
Interface	Port Powered USB 2.0 for laptops & desktops. 3 m standard thin cable, 5 m option.
Multiple Heads:	1 – 16 cameras. Parallel capture, serial read.
ISO 11146	Beam profile Second moment processing
Certification	RoHS, WEEE, CE
Measurable Sources	CW beams, Pulsed sources. CW to >25 kHz with single pulse isolation (UHS) User configurable Synchronous, Asynchronous & Variable Delay trigger options. Software programmable trigger input, +ve or –ve edge, 50 Ω or 1 kΩ
Measured Beam Powers	See the Saturation Beam Power/Pulse Energy Graph and Notes, below.
Wavelength: WinCamD-Uxx -1310 -IR UV	300 to 1150 nm 1290 to 1330 nm. Residual silicon response. 1290 nm long Pass filter provided. 1480 to 1680 nm. IR to Visible phosphor, 40 µm FWHM (Erbium response) UV converters for <350 nm (from StarTech Instruments) are available from Gentec-EO, with options down to X-ray. UV resolution to 1 µm.
Manual Beam Attenuation: Options:	Provided ND 4.0 (10,000:1) C-mount Neutral Density filters. [ND 4.0 at 546 nm, higher in blue, lower in near IR.] Screw stackable ND 1, 2, 3, 4, 5 available. EAM-2: 4-wheel stepped variable attenuator, 0 to 90 dB

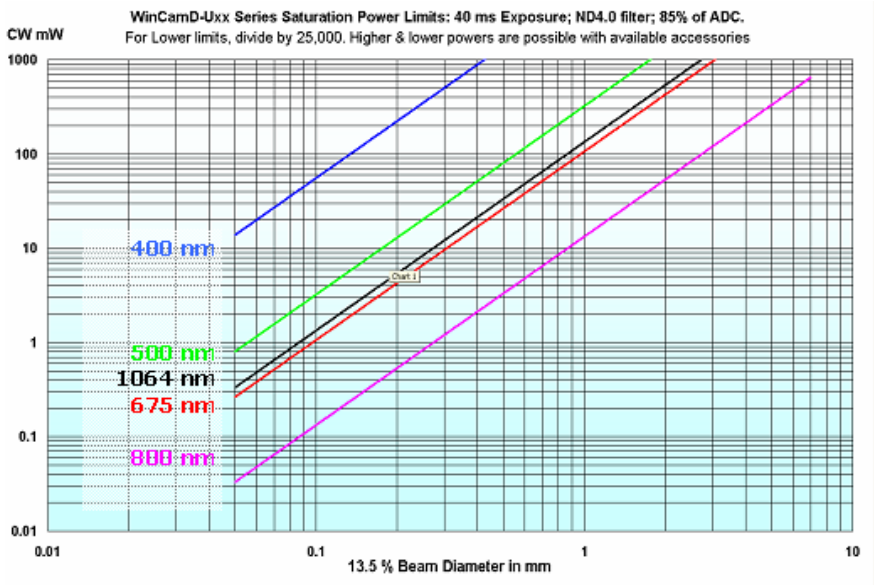
	CUB and CUB-UV 3 to 10 % beam samplers for high power beams 1% and 0.05% Holographic Beam Samplers (by gentec-eo)
Measurement Accuracy	0.1 µm processing resolution for interpolated diameters. Absolute accuracy is beam profile dependent – ~1 µm accuracy is frequently achievable. Centroid accuracy is also beam dependent. It can be as good as ±1 µm since it is arithmetically derived from all pixels above the centroid clip level.
Measured & Displayed Profile Parameters	Beam Diameter: Diameter at two user set Clip levels Gaussian & Second Moment beam diameters Equivalent diameter above a user defined Clip level Equivalent Slit and Knife Edge diameters Beam Fit: Gaussian & Top Hat profile fit & % fit Equivalent Slit profile Ellipticity: Major, Minor & Mean diameters. Auto-orientation of axes. Centroid Position: Relative and absolute Intensity Weighted Centroid and Geometric Center Beam Wander Display and Statistics Smoothing Filter: Triangular running average up to 10% FWHM
Displayed Profiles	2-D & 3-D plots 10, 16, 256 or max. colors or gray. Contoured display at 10 and 16 color.
Displayed Plots	X-Y Profiles, 2D, 3D Plots. Zoom to x10
Processing Options	Image & profile averaging, 1, 5, 10, 20, Continuous Background Capture and Subtraction User set rectangular or elliptical Capture region *.job files save all WinCamD custom settings for particular test configurations
Pass/Fail display	On-screen, in selectable Pass/Fail colors. Ideal for QA & Production.
Averaging	Beam dimension running average up to 50 samples
Log data and statistics	Min., Max., Mean, Standard Deviation. Up to 4096 samples
Relative Power Measurement	Rolling histogram based on user's initial input. Units of mW, µJ, dBm, % or user choice (relative to a reference measurement input)
Fluence	Fluence, within user defined area
Chip depth from housing	TBA mm. [Chip to face of filter ring = TBA mm]
Outline and Mounting	See drawings below
Weight, Camera Head	150 gm (5 oz)
Minimum PC Requirements: (Mac version not currently available)	1 GHz Pentium IV or higher running Windows XP; 512 MB RAM; 10 MB Hard Drive space; 1024 x 768 monitor, USB 2.0 hi-power (500 mA) port, or spare PCI half-card slot* (PC), or spare Cardbus slot* (Notebook/Tablet). *Gentec-EO can supply/recommend USB 2.0 PCI & Cardbus cards and hubs.

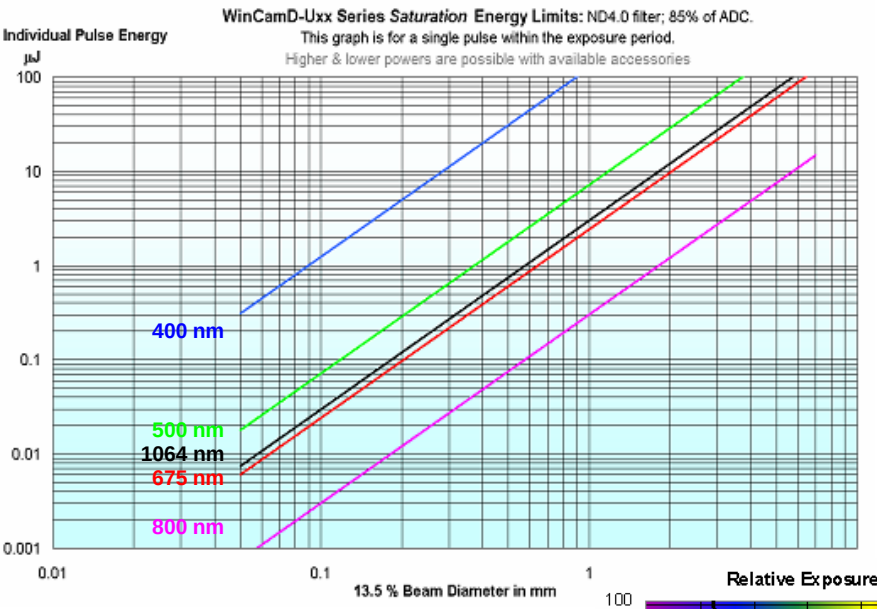
Saturation Beam Power / Pulse Energy Graphs

These two graphs allow you to simply determine the approximate maximum CW optical power (above) or pulse energy (below) that the standard WinCamD-UCM configuration can measure for your beam diameter and wavelength without additional attenuation. The Saturation Limit assumes:

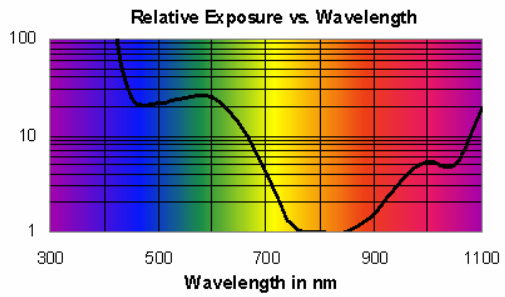
- The provided ND 4.0 filter in place
- The electronic shutter set at 40 µs, its lowest value
- The ADC gain set at 1, its lowest value
- The beam onto the ND filter must not exceed 5 W total power or 100 mW/per mm^2. [10 W/per cm^2]

The lower limit in the standard configuration is ~10^{-5} x the Saturation Limit.





Use the graph shown right to estimate for other wavelengths.



ORDERING INFORMATION

◊ 3 Year Warranty ◊ Free Software Upgrades ◊ 30 Day Sale or Return Evaluation PO

A Complete System comprises: Camera, ND 4.0 filter, Software, 3 m (10 ft) Cable, User Manual.
Generate the Part Number based upon the component descriptions, and limitations, in the table.
Your CMOS chip choice does not affect the system price.

Part Number =	Camera type +	CMOS chip +	Suffix (if required)
	WinCamD	-UCM	-UV
	TaperCamD	-UHR	-1310
	TaperCamD20-15	-UHS	-IR

e.g. WinCamD-UHR is a complete working system with a High Resolution CMOS with 5.2 µm pixels.
TaperCamD-UHS-1310 is a complete working system with a 14.4 x 10.8 mm FO Taper for 1310 nm.

Part Number component descriptions

WinCamD	Complete working USB 2.0 camera system. Add CMOS chip extension to generate Part #.
TaperCamD	WinCamD with 14.4 x 10.8 mm 1.6:1 FO taper on the CMOS sensor; –UHS & –UHR only.
TaperCamD20-15	WinCamD with 20 x 15 mm 2.27:1 FO taper on the CMOS sensor; –UHS & –UHR only.
-UCM	2/3" CMOS sensor for CW and low PRR, 1260 x 1024 pixels, 6.7 x 6.7 µm
-UHR	½" CMOS sensor for CW and low PRR, 1280 x 1024 pixels, 5.2 x 5.2 µm
-UHS	½" CMOS sensor for CW and high PRR, 656 x 496 pixels, 9.9 x 9.9 µm
-1310	Adds 50 mm C-mount tube and long-pass filter for 1290 to 1350 nm work.
-UV	Camera with 3 mm UG11 filter instead of ND 4.0. Works at 260 through 380 nm.
-IR	On-chip IR to visible phosphor converter for 1480 to 1600 nm. Not available on TaperCams.

Extra Cameras, priced lower than systems, programmed to only work as additional cameras on the same PC.

Extra cameras, come with Cable, Mount and ND filter, but no Software or User Manual. Confirm with factory.
Add additional suffix -X to the system Part #. E.g.: WinCamD-UHS becomes WinCamD-UHS-X

Accessories

EAM-2	Variable Attenuator, 93 dB optical dynamic range. Max.: 1 W/cm^2 /100 mJ/cm^2.
CUB & CUB-UV	Vis & UV Beamsplitters, 3% to 10% (polarization dependent) C-mount to camera.
ND1.0, ND2.0, ND3.0, ND 4.0, ND 5.0	Additional Neutral Density filters in ND 1 steps in stackable C-mount threaded holders. (ND4.0 filter comes as standard with the system.). See User Manual for curves.

Other Gentec-EO Profiling Instruments

BeamMap	Real Time M-Squared Multi-plane profiler 0.1 micron resolution on CW lasers Centroid, Alignment, Divergence, M^2, Visible and Telecom wavelengths.
Beam'R	0.1 micron resolution on CW lasers, 0.5 micron to 4 mm beam dimensions
BeamScope-P7	3.0 microns to 23 mm, M^2 accessory, ISO 11146 Standard Linear scanning slit, CW or Pulsed (prr >5 kHz) lasers, up to 23 x 45 mm scanned area